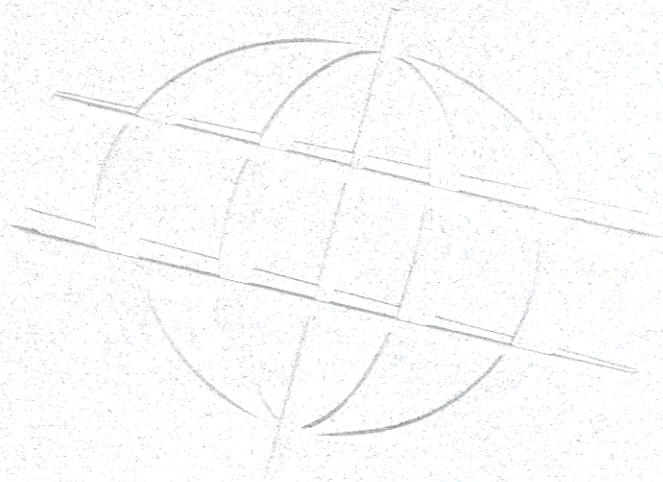


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Potential Indian Nuclear Force Postures

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Potential Indian Nuclear Force Postures

Abstract

This occasional paper examines the structure and key features of the Indian nuclear doctrine, including strategy, force structure, and command and control. Another section surveys the state of India's nuclear capabilities and delivery means, with a brief description of nuclear testing and the Prithvi and Agni missiles. The paper also discusses the threats that India's decision-makers perceive from Pakistan and the People's Republic of China. Finally, the author describes and evaluates a variety of force structures that analysts have suggested as possible strategic options for India. However, none of the various strategic options and architectures proposed by these analysts examine the prospects of arms control, confidence building, or cooperative monitoring to ensure crisis stability.

Acronyms

CBM confidence building measure

CSBM	confidence and security building measure
DRDO	Defence Research and Development Organization
EMP	electromagnetic pulse
IAF	Indian Air Force
ICBM	intercontinental ballistic missile
IGMDP	Integrated Guided Missile Development Program
kg	kilogram
km	kilometer
LoC	Line of Control
m	meters
MIRV	multiple independently targeted reentry
NSAB	National Security Advisory Board
PRC	People's Republic of China
SLV	Space Launch Vehicle-3
SSBN	Ship, Submersible, Ballistic, Nuclear

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Potential Indian Nuclear Force Postures

1. Introduction

On May 11 and 13, 1998, India departed from its long-standing policy of nuclear abstinence and detonated five nuclear devices at its test site at Pokhran in the Rajasthan desert.[\[1\]](#) The repercussions of the test were felt immediately both regionally and internationally. Pakistan, India's long-standing adversary, reacted sharply and vowed to take appropriate steps to protect its security interests. The other regional power, the People's Republic of China (PRC), unequivocally and vociferously condemned the Indian tests.[\[2\]](#) The great powers, most notably the United States, also condemned the tests and promptly moved to impose sanctions on India.[\[3\]](#) The United States also sought to assuage Pakistan's security concerns and attempted to forestall Pakistani nuclear testing. U.S. efforts to stop Pakistan from carrying out nuclear tests failed. On May 28 and 30, 1998, Pakistan carried out a set of six tests in the Chagai Hills of Baluchistan. The U.S., adhering to legislative mandates (particularly the Glenn Amendment), imposed a raft of sanctions on both India and Pakistan with the eventual goal of rolling back their nuclear programs.

This paper is divided into four sections. The first section examines the structure and key features of the Indian nuclear doctrine. The second section surveys the state of India's nuclear capabilities and delivery means. The third section discusses the threats that Indian decision-makers perceive from their two principal adversaries, Pakistan and the PRC. The fourth and final section describes and evaluates a number of force structures that various analysts have proffered as possible strategic options for India.

For the purposes of analysis, this paper assumes that, for the foreseeable future, India, despite American and other pressures to the contrary, will maintain and even develop its extant nuclear weapons and ballistic missile capabilities. The pursuit of these goals places India on a direct collision course with stated American policy. As presently formulated, American nonproliferation policy remains adamantly opposed to the further escalation and expansion of India's capabilities in nuclear weapons and ballistic missile programs.[\[4\]](#) The eventual disposition of the Indian nuclear weapons program will be the result of congeries of drivers and constraints, both domestic and external.

2. The Draft Indian Nuclear Doctrine

In the wake of the nuclear tests, India constituted a National Security Advisory Board (NSAB). This organization, composed of journalists, former bureaucrats, and diplomats, was given the responsibility of drafting India's nuclear doctrine. On August 17, 1999, this body produced a draft Indian nuclear doctrine.^[5]

The draft Indian nuclear doctrine provides useful clues about the possible course of weaponization in India. Three issues in the doctrine deserve comment. They are matters of strategy, force structure, and command and control. The nuclear strategy that is embedded in this doctrinal statement is derived from the early canons of American nuclear strategy,^[6] which involves a concept of deterrence through the promise of retaliation and punishment. The doctrine states that India will not be the first to initiate a nuclear strike, but will respond with punitive retaliation should deterrence fail.^[7] To achieve this end, the doctrine calls for "sufficient, survivable and operationally prepared nuclear forces," a "robust command and control system," "effective intelligence and early warning capabilities," "comprehensive planning and training for operations in line with strategy," and the requisite "will to employ nuclear forces and weapons."^[8]

The document then discusses the requisite force structure to carry out the deterrent function. Accordingly, it calls for a triad consisting of "aircraft, mobile land-based missiles and sea-based assets"^[9] It also seeks to ensure the survivability of India's nuclear forces through mobility, deception, dispersion, and the creation of redundant systems. Simultaneously, it visualizes the creation of sufficient assets to absorb an initial attack and still maintain adequate retaliatory capabilities.

Finally, it devotes substantial attention to the matter of command and control. In keeping with India's well-established system of civilian supremacy, it locates the release authority for the use of nuclear weapons in the person of the prime minister of India.^[10] The doctrine also recognizes the need for an infrastructure to support a survivable command, control, communications, intelligence, and information network.

The assumptions of the nuclear doctrine are certainly heroic. If all these projected assets and capabilities were developed, India would have a substantial nuclear arsenal comparable in size and complexity to those of China, France, or the United Kingdom. The acquisition of all these assets in the absence of a robust arms control regime involving Pakistan and China could also contribute to an arms race spiral in the region and contribute to strategic instability.

Despite its position on the matter of the first use of nuclear weapons, the doctrine is silent about the question of arms control. Beyond a commitment to deterrence by retaliation and punishment, it makes no attempt to provide any reassurance to Pakistan.^[11] Apart from these limitations, how well does the draft doctrine conform to India's current nuclear and ballistic missile assets?

3. Current Capabilities: Missiles and other Means of Nuclear Weapons Delivery

India had evinced an interest in space research and rocketry as early as the early 1960s. The Indian ballistic missile program, however, started in 1968 under the code name Project Devil.^[12] Since 1983, under the aegis of the Defence Research and Development Organization (DRDO), India embarked upon the Integrated Guided

Missile Development Program (IGMDP). The IGMDP has produced a panoply of missiles since its inception. They include short-, medium-, and intermediate-range missiles.^[13] Of all the missiles that the IGMDP has developed, two are of particular significance to this study as they are both capable of being mounted with nuclear weapons. These two missiles are the short-range *Prithvi* (Earth) and the intermediate-range *Agni* (Fire). A good deal of information is available in the public domain about the performance characteristics of both these missiles.

The first, the *Prithvi I*, has been inducted into the Indian Army. It has a range of about 150 kilometers (km) and can carry a payload of about 1000 kilograms (kg). The *Prithvi II*, which is under the purview of the Indian Air Force, has a range of 250 km and a payload of 500-750 kg. Presently, the *Prithvi III*, a naval version of the missile, is under development. The accuracy of the *Prithvi* is the subject of some debate.^[14] The principal customer of the *Prithvi* is the Indian Army. As of 1999, 75 *Prithvis* were ordered by the army, 25 by the air force, and 20-50 *Prithvis* had been inducted into the 333 Missile Group.^[15] In September 2000, Minister of Defense George Fernandes announced that the government had made a decision to produce 300 *Prithvis*.^[16]

The other, the *Agni*, an intermediate-range ballistic missile, was first test-fired in May 1989. Presently, there are two variants of the *Agni* and a third is under development. The basic version is a two-stage missile with the first stage relying on the first-stage, solid-fuel booster motor of an earlier Space Launch Vehicle-3 (SLV). The second stage of the missile is most likely a shortened version of the *Prithvi*. The *Agni* is 18 meters (m) long and is capable of delivering a 1000 kg payload. It has a closed-loop inertial guidance system based upon West German technology. The *Agni II* uses solid propellant. The *Agni II* is also a far more accurate missile and uses a terminal navigation and guidance system relying upon ground-based beacons. In April 1999, India successfully test-fired the *Agni II* with a range of 2,000 km from a launch site in the Balasore district in the coastal state of Orissa. It is believed that India is now attempting to develop a third version of the *Agni* with a range of 5,000 km.

In addition to its fitful but growing ballistic missile capabilities, India also possesses aircraft that could be used to deliver nuclear weapons. These include the four squadrons of the Anglo-French *Jaguar*, two squadrons of the French *Mirage 2000H*, six squadrons of Soviet MiG-27s, and three squadrons of MiG-29s.^[17]

Finally, India is attempting to build a nuclear-powered submarine that should eventually be able to deliver nuclear weapons. Simultaneously, India is developing both ballistic and cruise missile versions of a sea-based ballistic missile, the *Sagarika*. Progress on the nuclear-powered submarine and the missile has been fitful. Various delays, bureaucratic snafus, and cost overruns have characterized these programs.^[18]

3.1.1.1 Capabilities: Nuclear Weapons

India has long pursued a nuclear weapons program.^[19] The program was an outgrowth of an initial civilian nuclear power program. The timing of and the motivations for the shift to an explicit nuclear weapons program is the subject of considerable and vigorous debate. An argument that commands popularity in the American nonproliferation community suggests that India pursued and eventually tested nuclear weapons primarily for purposes of prestige, status, and domestic politics.^[20] An alternative argument holds that while considerations of prestige and status were present, the program's roots can be traced to perceived and growing threats from India's two principal adversaries, the PRC and Pakistan. Regardless of the motivations underlying the Indian nuclear program, India's nuclear weapons capabilities constitute an existential reality.^[21] What precisely are India's nuclear weapons capabilities?

India first tested a nuclear explosive device at its Pokhran desert test site in the state of Rajasthan on May 18, 1974.^[22] This test had a purported yield of 12 kilotons. In the wake of widespread international disapprobation

and the suspension of all nuclear-related assistance from Canada and the United States, India desisted from carrying out further tests.^[23] While India did not carry out further tests, it did continue work on weapons design. According to one source, it enhanced its weapons design and fabrication facilities over the next decades, reducing the size of the weapons and increasing their efficiency and yield through boosted fission using tritium.^[24] By the end of 1995, India's plutonium stockpile was apparently sufficient to manufacture some 65 nuclear weapons. This stockpile was expected to increase by 2000 to be able to produce as many as 85 to 90 weapons.^[25] A more recent estimate suggests that India has stockpiled enough weapons-grade plutonium to produce 78 nuclear weapons and possesses some 60 nuclear weapons.^[26]

On May 11, 1998, after a hiatus of over 20 years, India again carried out three subterranean tests at the Pokhran test site. The three devices that were tested reportedly included a fission device with a yield of about 12 kilotons, a thermonuclear device with a yield of 42 kilo-tons, and a sub-kiloton device. All three were detonated near simultaneously. Subsequently, on May 13, India carried out two more tests that were also in the sub-kiloton range. It should be mentioned, however, that some controversy surrounds the yield of these weapons.^[27]

4. The Perceived Threat: Pakistan

Despite the significant asymmetry of forces, India perceives a military threat from Pakistan. The sources of threat are threefold and closely intertwined. The first is the legacy of various conflicts. India has fought three wars with Pakistan, in 1947-48, 1965, and 1971.^[28] In addition to these wars, a series of crises have punctuated Indo-Pakistani relations. In 1987, India and Pakistan nearly plunged into another war through a process of misperception and miscalculation stemming from India's largest peacetime military exercise, "Brasstacks."^[29] There is little question that the Brasstacks military exercise provoked Pakistani misgivings about the possibilities of a surprise Indian attack in the guise of a military exercise.^[30]

In 1990, India and Pakistan, despite persistent denials to the contrary from Islamabad and New Delhi, also came close to another conflict, one with a distinctly nuclear edge.^[31] The 1990 crisis arose from Pakistan's involvement in and India's reaction to the outbreak of an indigenous based insurgency in the Indian-controlled portion of the disputed states of Jammu and Kashmir in December 1989.^[32] The most recent crisis that punctuated Indo-Pakistan relations was again in Kashmir along the Line of Control (LoC).^[33] Many observers would accept the proposition that Pakistan initiated the wars of 1947-48 and 1965 and the Kargil crisis of 1999. India, on the other hand, initiated the 1971 war, and was partially responsible for precipitating the Brasstacks crisis.^[34]

The second and inextricably intertwined factor is the unresolved status of the states of Jammu and Kashmir. Pakistan's initial claim to Kashmir, the only Muslim-majority state in the Indian Union, was irredentist.^[35] India's counterclaim was based upon the defense of its status as a secular state. Pakistan's inability to cohere solely on the basis of religion undermined its moral and ideological claim to Kashmir. In a similar vein, India's steady departure from its secular commitments has also eroded its normative claim to Kashmir. Today the two states claim Kashmir simply on the basis of statecraft. Simply stated, states do not willingly or readily part with territory that they deem to be theirs.

Finally, from the Indian standpoint, Pakistan has historically attempted, and continues, to draw in external powers into the region to further its strategic goals. From the perspective of New Delhi, Pakistan played an integral role in bringing the Cold War to the subcontinent, thereby altering the putatively natural balance of power in the region.^[36] In the 1990s, in particular, in Indian perceptions, Pakistan also became a strategic surrogate for the PRC in South Asia.

In the summer of 2000, Indo-Pakistani relations had probably reached their lowest ebb in decades because of deep mutual mistrust after the Kargil conflict. The confidence and security building measures (CSBM) regime, with the exception of the nuclear nonattack agreement of 1988, had frayed to the point of extinction.

5. The Perceived Threat: China

India, contrary to many Western assessments, perceives a historical and long-term threat from the PRC. India's fears of China can be traced back to the 1962 border war.^[37] During the 1962 crisis, the Indian military was subjected to various forms of political interference in the higher direction of the war. Worse still, it was fundamentally unprepared for high-altitude warfare and lacked the requisite logistical support to conduct operations in the Himalayas. Not surprisingly, the Indian forces suffered significant casualties. More important, its morale was seriously damaged. As a consequence of this war, China also came to occupy some 14,000 square miles of contested territory.

The psychological impact of this war on Indian decision makers was far-reaching and deep seated. The Indians had not only suffered a major military debacle but feared further Chinese intransigence based upon other Chinese territorial claims. In the aftermath of this war, India, though formally committed to a policy of nonalignment, sought substantial military assistance from the United States.^[38] When the United States did not prove to be forthcoming, India turned to the Soviet Union for military assistance.

India also embarked upon a major domestic program of military modernization in the aftermath of this conflict. It sought to build a million-man army, raise ten new mountain divisions equipped for high-altitude warfare, and equip a 45-squadron air force with supersonic aircraft.^[39] During the 1960s, few improvements took place in Sino-Indian relations. Despite this growth in conventional military power, Indian civilian and military decision makers were alarmed by China's nuclear test in 1964. They watched with growing alarm and concern as China continued to conduct further tests and proceeded inexorably toward full-fledged nuclear power status.^[40]

In an attempt to redress this growing military asymmetry, India approached the great powers to obtain a nuclear guarantee but had no success. The failure to obtain a nuclear guarantee in the mid-1960s played a vital role in propelling India to acquire a nuclear weapons option.^[41]

A fitful thaw in Sino-Indian relations took place in the 1970s with the resumption of full diplomatic relations. However, it was not until the late 1980s that more serious discussions resumed about the unresolved and contentious border question. Nevertheless, at least one crisis punctuated Sino-Indian relations in 1986. This was a major border incident at Sumdorong Chu near the Nepal-Bhutan-India trijunction.^[42] In the wake of this border conflict, after several rounds of negotiations, India and China agreed on a series of confidence building measures (CBMs) designed to reduce the likelihood of conflict as a consequence of miscalculation, inadvertence, and misperception along the Himalayan border.^[43] Unlike in the Indo-Pakistani case, in this context both sides have adhered to the spirit and the letter of these CBMs even though progress on the border question remained, at best, glacial.

Sino-Indian relations again took an important plunge immediately before the India nuclear tests and especially thereafter. Just weeks before the nuclear tests, the new Indian Minister of Defense, George Fernandes, long known for his pro-Tibetan views, publicly referred to the PRC as "India's enemy number one."^[44] The Chinese were still piqued with Fernandes' remark when Prime Minister Atal Behari Vajpayee inflamed their sentiments further. In the wake of the nuclear tests, Prime Minister Vajpayee, in a letter to President Clinton explaining the motivations underlying the nuclear tests, alluded to the threat that India faced from the "neighbor to the north."

6. Possible Force Structures

To cope with these perceived threats, a number of Indian political commentators and strategic analysts have discussed potential nuclear force structures for India. Five such force structures are summarized below. They cover a wide spectrum of possible nuclear architectures and strategies. The discussion of these possible force structures will extend from the most expansive to the most limited.

Bharat Karnad, an Indian journalist and strategic affairs commentator, has proffered the most expansive nuclear weapons architecture for an Indian deterrent. Karnad's preferred nuclear weapons architecture involves the fashioning of a thermonuclear deterrent.^[45] Karnad suggests that three considerations call for a thermonuclear deterrent. First, he believes that only a thermo-nuclear deterrent can hold sufficient assets of a key adversary, presumably China, at risk. He writes, "The threat of instant destruction on this scale will more credibly deter the potential adversary than 200 kiloton weapons with their more limited destructive power against the same targets."^[46] Second, he believes that the possession of a thermonuclear deterrent will enable India to achieve "escalation dominance" against China in a future crisis, namely the capacity to contend with China at all levels of the nuclear escalation ladder. Third, he believes that given the far greater destructive power of thermonuclear weapons, they would be under better control than a limited nuclear weapons capability.

These arguments lead Karnad to call for the creation of a force structure with at least 300 nuclear weapons over a 30-year time span. This force would be triadic and include nuclear-capable long-range aircraft, intermediate-range ballistic missiles, and submarine-launched ballistic missiles.

Both his analysis and his prescriptions are quite problematic. First, his contention that only a thermonuclear force would constitute a sufficient deterrent against China is questionable. There is little reason to believe that an adequate number of survivable nuclear weapons would not hold key Chinese assets at risk. Second, he fails to postulate or even suggest the kind of crisis in Sino-Indian relations that would call for India to achieve "escalation dominance." As argued earlier, the Sino-Indian relationship, though fraught with many problems, lacks the strategic ballast to precipitate a crisis where India would find it necessary to successfully deter the Chinese at all levels of escalation. His contention that "escalation dominance" is critical to a robust deterrent strategy simply reflects an uncritical acceptance of the postulates and assumptions of a particular school of nuclear deterrence. This school, associated with nuclear warfighting, assumes that to effect robust deterrence, states have to possess capabilities to meet the challenges of nuclear-armed adversaries at all possible levels.^[47] Third, now that India possesses nuclear weapons, it will have to forthrightly address the "usability paradox," namely that its weapons will be under such firm control that they will be used when so directed but also not subject to unauthorized use.^[48] India does not need to pursue a thermonuclear option to ensure adequate control over its nuclear assets. Fourth, his analysis provides little or no discussion of what critical Chinese assets India could effectively threaten with the force architecture that he visualizes for deterring Chinese malfeasance. Fifth, his analysis elides the likely Pakistani misgivings about India's acquisition of this large, powerful nuclear force. He appears to believe that this force configuration with the requisite capability to roundly threaten China would not provoke Pakistani anxieties.^[49] There is no logical or substantive reason in the absence of an extensive arms control and confidence building measures regime to make this assumption. As Neil Joeck argues, drawing on the work of Sir Michael Howard, deterrent strategies do little to *reassure* adversaries.^[50] Sixth and finally, he ignores the reactions that India's unilateral pursuit of a triadic thermonuclear force would have on Chinese nuclear force structures.^[51] The expansion of Chinese nuclear capabilities, in turn, would have adverse consequences for American force planning and thereby have spiraling consequences for the existing global nuclear gyre.

A retired Indian army officer and strategic commentator, Vijai K. Nair, has also constructed an almost equally

expansive concept of a potential Indian force structure.^[52] There are, however, important substantive and organizational differences between his analysis and that of Karnad. Nair provides a detailed discussion of the requirements for deterring both Pakistan and China. He believes that to adequately deter these two adversaries, India must have a secure second-strike capability. In practical terms, this would entail “degrading that country’s capability of continuing as a socioeconomic entity.”^[53] In the case of China, India would need to have sufficient capabilities to put at risk five or six major industrial centers and two ports that are designed to service China’s nuclear ballistic missile submarine (SSBN) fleet. To accomplish these ends, Nair calculates that India would need an aggregate number of 132 nuclear weapons. These weapons, to maximize survivability, would have to be dispersed amongst nuclear-capable submarines, intermediate-range, land-based ballistic missiles, and manned aircraft. Finally, Nair provides a general discussion of the significance of command and control of nuclear forces. He also provides some guidelines for the creation of robust capabilities to prevent unauthorized and inadvertent usage.

Nair’s prospective nuclear force is actually quite close to the theoretical requirements that have been spelled out in the draft Indian nuclear doctrine. However, India is still a considerable distance away from being able to fulfill these requirements. As argued earlier, India is well over a decade away from being able to deploy a nuclear-capable submarine. Also, its intermediate-range ballistic missiles are still in an incipient stage of development. All it does possess are long-range, nuclear-capable aircraft.^[54] Even these would have to be suitably modified to be able to deliver gravity-released nuclear weapons. Nair’s conceptualized force may indeed be the direction that India eventually hopes to achieve. Its current capabilities, however, fall considerably short of this proposed design.

K. Subrahmanyam, India’s preeminent strategic analyst, has provided a more limited concept of a possible nuclear force structure for India. Subrahmanyam’s case for a minimum deterrent was made before India’s *Shakti* tests of May 1998.^[55] His analysis nevertheless remains relevant for the present strategic context in South Asia. At the outset, Subrahmanyam eschews any interest in the development of warfighting capabilities for India. He contends that the threats that India faces from China and Pakistan rule out the need to develop warfighting capabilities. To be able to deter the Pakistanis or the Chinese from subjecting India to nuclear coercion, Subrahmanyam argues that all India needs is adequate retaliatory capabilities. Such capabilities, in his view, can be contained within the realm of a finite deterrent force. To this end he posits that India needs to acquire around 60 deliverable warheads eventually distributed across four different weapons systems.^[56] Unlike Nair, however, Subrahmanyam does not specify the likely targets that these 60 warheads would hold at risk. Subrahmanyam also argues that a finite force, such as the one he proposes, need not have elaborate command and control procedures. He does concede, however, that:

“...even the countries that envisage only a minimum deterrent strategy, no-first-use and no high figure multiple weapon exchanges, will have to take steps to ensure succession in regard to legitimate authority to order the use of weapons, the command linkages between supreme civilian authority and the Service chiefs and down to units which are able to deliver retaliatory strike.”^[57]

General Krishnaswami Sundarji, a former Indian chief of army staff, echoed Subrahmanyam’s interest in a minimum deterrent strategy in a chapter that he contributed before his untimely death. Sundarji, like Subrahmanyam, also eschewed any need for India to pursue a more expansive nuclear posture. He also contended that as long as India had assured second-strike capabilities there was little need for a more complex nuclear striking force. Writing in 1996, he visualized a three-stage development of a viable nuclear force structure for India.^[58] In the initial phase, he envisaged a force solely reliant on nuclear-capable aircraft. In the second phase, nuclear-capable aircraft would be augmented with the deployment of nuclear-tipped *Prithvis*. In the final phase, the force would be composed of the *Agni II*, the *Agni I*, the *Prithvi*, and various nuclear-capable aircraft. Sundarji, however, did not specify the size of this potential nuclear force, nor did he provide a discussion of the likely targeting policy that India would have to employ to achieve a level of “unacceptable

damage.” Finally, he devoted a short section underscoring the significance of the command and control of nuclear weapons and the need to develop a National Command Authority.

Few Indian naval planners have contributed to the nuclear debate within India.^[59] An important exception is a recent, comprehensive work by retired Rear Admiral Raja Menon.^[60] Menon initially summarizes the key developments and epochs in the development of American nuclear strategy and then provides an account of the evolution of India’s nuclear and ballistic missile programs. He then assesses the state of India’s ballistic and nuclear weapons programs. In turn, he discusses the present and future threats that India faces from Pakistan and the PRC. These threats, he contends, can best be met through the eventual Indian acquisition of a subma-rine-based nuclear force composed of at least six nuclear submarines. Each submarine would carry twelve missiles. If equipped with multiple independent targeted reentry vehicles (MIRVs), these could carry as many as 96 warheads. At any given moment, at least two of these submarines would be on patrol. He contends that a submarine-based force would be the least vulnerable and satisfy India’s need for a second-strike retaliatory capability. Until India acquires this submarine-based force structure, he suggests that the country rely on a mobile intercontinental ballistic missile (ICBM) force based upon a modification of existing railway grids.^[61]

Menon also provides an extensive discussion of the necessary steps that India will have to undertake to develop a robust command and control system. To his credit, he addresses both the organizational and the technological dimensions of this vital issue. Finally, Menon, unlike many of his counterparts, provides an extensive discussion of possible and desirable arms control and CBMs that could be implemented between India, Pakistan, and China to reduce the likelihood of misperception, miscalculation, and inadvertent escalation. These include both declaratory state-ments as well as various technological steps such as the exchange of doctrinal information, the adoption of similar alert status for missiles, the joint development of permissive action links, and the electronic tagging of missiles.^[62]

Menon’s sensitivity toward questions of arms control and strategic stability constitute an important first step in the discussion of possible nuclear force postures for India. There are two important drawbacks to Menon’s analysis. First, as he himself recognizes, India’s ability in the face of various existing sanctions to manufacture a submarine-based force is still quite uncertain. Second, Menon fails to appreciate the existing bureaucratic-technological-scientific momentum that India’s existing missile programs have already gathered. How will this course be reversed? Why would the bureaucrats, scientists, and policy-planners who have invested significant efforts in the development of the existing land-based ballistic missile program shift direction and willingly acquiesce in its termination?

A final discussion of force structure exists in a recent chapter by a senior retired Indian Air Force (IAF) officer, Air Vice-Marshal Kapil Kak. He too calls for the development of a finite deterrent capacity solely for the purposes of retaliation based upon a relatively invulnerable submarine-based force.^[63] Until India can build a sea-based retaliatory capability he contends that it should aim to create a dyadic force based upon land-based missiles and nuclear-capable aircraft. He also suggests that for India, a force of about 100 nuclear warheads should suffice. Kak argues that a small nuclear force, such as the one he envisages, would not require the elaborate command, control, and intelligence functions that were required for the far more extensive forces of the superpowers or even the principal nuclear weapons states. However, he does recog-nize that:

Whatever structures need to be created, these must ensure high levels of surviv-ability for the top leadership and provide foolproof and redundant communica-tions (digital telecom, space, radio) with the Strategic Command and nuclear forces. Electromagnetic pulse (EMP) protection requirements for critical com-mand centres and communication nodes may also have to be considered.^[64]

Kak’s prospective force structure conforms most closely to India’s existing capabilities. However, even he postulates the development of a command, control, communications, and intelligence system that has yet to be

constructed. Also, despite his very realistic assessment of India's existing and future capabilities, Kak avoids the issue of nuclear targeting and questions of what would constitute the infliction of "unacceptable damage" on India's nuclear-armed adversaries, Pakistan and China.

7. Assessing the Force Structures

All the projected force architectures discussed above have particular shortcomings and limitations. They also have some common problems. Among other issues, most of them fail to adequately assess the likely impact of India's strategic nuclear programs on those of Pakistan and China. Even when this issue is addressed, the discussions are mostly cursory.^[65] More to the point, with the striking exception of Rear Admiral Raja Menon's analysis, none of the various strategic options and architectures that have been discussed examine the prospects of arms control, confidence building, and cooperative monitoring to ensure crisis stability.

It is reasonable to assume that no Indian government within the foreseeable time horizon is likely to dismantle India's ballistic missile and nuclear weapons programs. Based on such an assumption, the majority of the existing proposals fall considerably short of addressing the needs of strategic and crisis stability in the region. The lack of discussion of these questions in the Indian strategic debate should be of concern not only to Indian analysts and policymakers but to all individuals concerned about the avoidance of a nuclear conflagration in South Asia.

About the Author

Sumit Ganguly is a Professor of Asian Studies and Government at the University of Texas at Austin. He has previously taught at James Madison College of Michigan State University, Columbia University, Hunter College, and the Graduate Center of the City University of New York. A specialist on the politics of South and South-East Asia, he has written extensively on democratization, ethnic conflict, and violence. His research and writing have been supported by grants from the American Institute of Indian Studies, the Asia Foundation, the Carnegie Corporation of New York, the Ford Foundation, the W. Alton Jones Foundation, the Smithsonian Institution and the United States Institute of Peace. He has also held fellowships at the Woodrow Wilson International Center for Scholars in Washington, D.C. and at the Center for International Security and Cooperation at Stanford University. His most recent book is *The Crisis in Kashmir: Portents of War, Hopes of Peace* (The Woodrow Wilson Center Press and Cambridge University Press).

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¹ India had previously carried out one nuclear test at the same test site in May 1974. Faced with widespread international disapprobation, it had then refrained from carrying out any further tests. For an early analysis of the motivations underlying the Indian nuclear test of 1974, see Sumit Ganguly, “Why India Joined the Nuclear Club,” *Bulletin of the Atomic Scientists*, April 1983, Volume 39, Number 4, pp. 30–33.

[2] For a sampling of adverse reactions to the Indian and Pakistani tests, see the various articles in “India Bombs the Ban,” *Bulletin of the Atomic Scientists*, Volume 54, Number 4, July/August 1998.

[3] On the imposition of the sanctions regime and its gradual erosion, see Robert M. Hathaway, “Confrontation and Retreat: The U.S. Congress and the South Asian Nuclear Tests,” *Arms Control Today*, Volume 30, Number 1, January/February 2000, p. 7–14.

[4] The formal U.S. position is spelled out in Strobe Talbott, “Dealing With the Bomb in South Asia,” *Foreign Affairs*, March/April 1999, Volume 78, Number 2.

[5] See “Draft Report of National Security Advisory Board on Indian Nuclear Doctrine” at http://www.indianembassy.org/polic1/4ine_aug_17_1999.html#2.

[6] The doctrine reflects the concepts of deterrence that are discussed in Glenn Snyder, *Deterrence and Defense: Toward a Theory of National Security* (Princeton: Princeton University Press, 1961.)

[7] See “Draft Report of National Security Advisory Board on Indian Nuclear Doctrine,” op. cit, p. 2.

[8] Ibid., pp. 2–3.

[9] Ibid., p. 3. Critics of the draft nuclear doctrine have asserted that the creation of a triad may impose dramatic costs upon the Indian defense budget. They have also criticized the vagueness of the term “sea-based assets.” See for example, R. Ramachandran, “Unclear nuclear identity,” *Frontline*, Volume 16, Issue 18, August 28–September 10, 1999, or go to <http://www.the-hindu.com/fline/fl1618/16180160.htm>.

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- [16] <http://www.bharat-rakshak.com/MISSILES/News/00-Sept.html>
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- [22] Indian decision makers had referred to this test as a “peaceful nuclear explosion.”
- [23] There is some evidence that India did consider carrying out further tests but eventually canceled the plans. See Perkovich, *India’s Nuclear Bomb*, op. cit.
- [24] Federation of American Scientists, “Nuclear Forces Guide,” <http://www.fas.org/nuke/guide/india/nuke/index.html>.
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- [49] Karnad in Mattoo (ed.), *India’s Nuclear Deterrent*, op. cit., pp. 126–137.
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- [54] Michael Quinlan, "How Robust is India-Pakistan Deterrence?" *Survival*, Volume 42, Number 4, Winter 2000-01, pp.141-154
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- [62] Ibid., pp. 201–206.
- [63] Kapil Kak, “Command and Control of Small Nuclear Arsenals,” in Jasjit Singh (ed.), *Nuclear India* (New Delhi: Knowledge World, 1998), pp. 266–285.

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